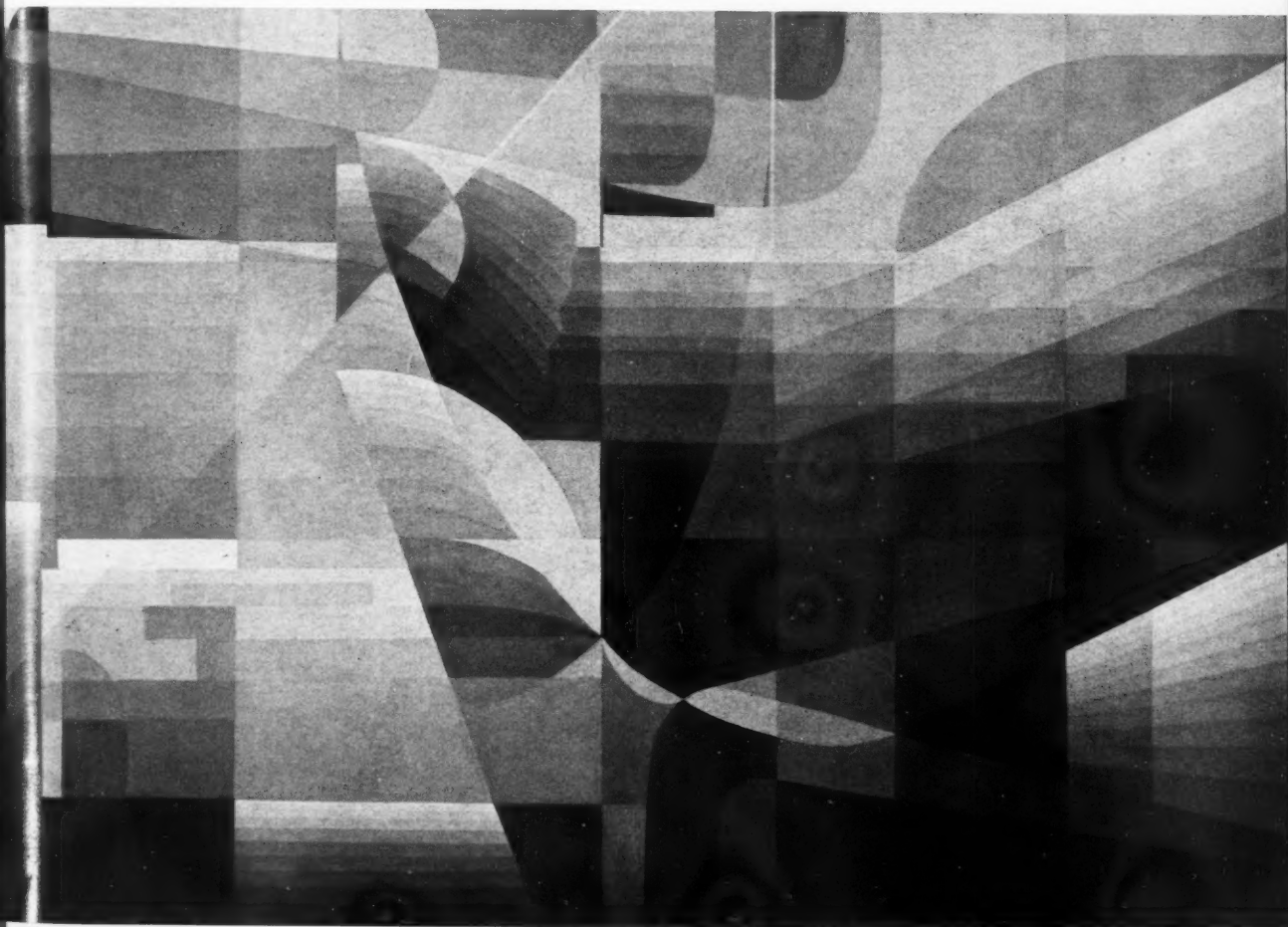


# MAIN CURRENTS

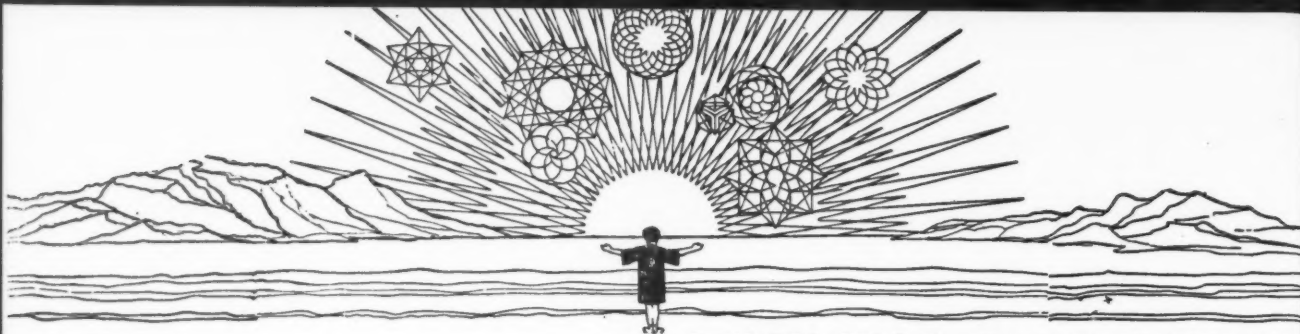
## IN MODERN THOUGHT



NOVEMBER, 1958

BOSTON UNIVERSITY  
COLLEGE OF LIBERAL ARTS  
LIBRARY

VOL. 15, NO. 2



Copyright 1932 by Claude Braddon—used by permission of Alfred A. Knopf, Inc.

# MAIN CURRENTS IN MODERN THOUGHT

A cooperative journal to promote the free association of those working toward the integration of all knowledge through the study of the whole of things, Nature, Man, and Society, assuming the universe to be one, dependable, intelligible, harmonious.

## CONTENTS

An Evolutionary Psychology of Wholeness	Ira Progoff	27
Man, Energy and the Life Process	Halbert L. Dunn	32
Discovery of the Gifted Child	Henry Winthrop	37
Source Readings:		
Structuralism—Scientific Method Applied to Art		42
Science and the Liberal Arts on Trial		43
The Social Roots of Education's Dilemma		44
The Process of Being Human		45
News and Notes		46
Reviews:		
The Strategy of the Genes, by C. H. Waddington		47
The Origins of Life, by Albert Ducrocq		47
The Undiscovered Self, by Carl Jung		48

On the cover: A Structure of Gray, by Hilaire Hiler. This painting was exhibited at the Provincetown Art Festival where it won an award, and, more recently, at the Newark School of Fine and Industrial Art. For some discussion of the principles of Structuralism, of which this is an example, see page 42.

EDITOR: F. L. KUNZ  
ASSOCIATE EDITOR: E. B. SELLON  
BUSINESS MANAGER: MARGARET WAGNER  
PUBLISHER: JULIUS STULMAN

The journal of the Foundation for Integrated Education, 246 East 46th Street, New York 17, N. Y., to whom subscriptions and inquiries should be addressed. Published 5 times a year in Sept., Nov., Jan., March and May. Subscription price, \$3.00 a year, foreign, \$3.50. MAIN CURRENTS IN MODERN THOUGHT is published to call attention to significant contributions to learning currently being made in the multiple fields relating these advances to each other and to classical and contemporary views of Eastern, European and American thinkers. It is designed to save time for the reader by providing a vantage-ground from which the whole world of knowledge may be surveyed and kept in proportion as it moves toward integration. Its editors assume that the principles of art, the universals of philosophy, the laws of Nature and Man as formulated by science and the truths of comparative religion, can be orchestrated into a harmonic, meaningful, ethical body of teaching which can and should be made the central core of current study in the educative process at all levels. Contributors to MAIN CURRENTS enjoy full liberty of opinion and expression in these pages.

In condensing text, square brackets [ ] indicate editorial interpolation. Three dots . . . indicate a word, phrase or passage omitted. Copyright 1958 by F. L. Kunz, Port Chester, New York. Entered as second class matter April 13, 1932, at the post office at Port Chester, New York, under the Act of March 3, 1879. (Reentered as second class matter November 12, 1953 at the post office at Port Chester, New York, under the Act of March 3, 1879).

# AN EVOLUTIONARY PSYCHOLOGY OF WHOLENESS

Ira Progoff

## Towards a Science of Human Growth at the Creative Edge of Personality

FOR an individual to be called a *modern man* signifies something more than the mere fact that he happened to be born at a date that left him no alternative but to live out his years in the vicinity of the twentieth century. It means something more also than a person who has uncritically absorbed the fads and foibles of his generation. Rather, to be called a *modern man* in a full and meaningful sense implies that a person has felt in the depths of his being the impact of the basic and characteristic problems of the modern age. And more, it means that he has not run away from these problems, but has permitted them to work within him, to disturb him profoundly and intimately, and that in opening himself to experience their meaning he has drawn them toward a resolution at least within his own understanding.

One of the most fundamental problems of this kind concerns the difficulties that arise from the modern way of thinking about man as a member of the animal kingdom. Since ancient times there have been many conceptions of human nature phrased in materialistic terms, understanding man as exclusively a creation of the natural world. But the Darwinian view that the evolution of species takes place by means of natural selection carried all previous materialisms to a new level. It presented a specific and documented principle to account for the connection between animal species and the human species. Its impact was much greater than any ordinary scientific hypothesis, for it was indeed much more than an hypothesis. It was a view of life, an encompassing conception of the life process as a whole and of man's place within it.

The Darwinian theory of evolution brought to modern civilization a full perspective in which all forms of life, vegetable and animal, could be understood, human beings among them. After Darwin, any person who gave even the slightest lip service to the spirit of science had to retain a primary place in his thinking for the conception that man is not only a part of nature, but that he has emerged *in the course of time* out of the animal kingdom. What then was he to conclude about the creative element in human personality and about what had been spoken of as the *spiritual* in man?

In western civilization it has been felt that the

natural, biological side of man is somehow different from and in conflict with the human spirit. Body and soul have been thought of as a dichotomy, especially in traditional religious thinking, and such conceptions reach very deeply into the habits of thought, the unexamined assumptions and hidden presuppositions, that vitiate the thinking of an entire epoch upon a given subject. This is one very fundamental reason why the Darwinian conception of man's origins had so strong an impact upon western man. It gave rise to controversies of a fiercely religious intensity. And no wonder. It was very deeply rooted religious conceptions that were challenged by the Darwinian hypothesis.

There is, however, considerable reason to think that the dichotomy between body and spirit is not a necessary conception at all, but that it is a product of the philosophical and theological heritage peculiar to western civilization. And further it seems that holistic thinking in the twentieth century may go far toward supplanting this division of body and spirit in man, particularly as the holistic conception of man is implemented by the insights of depth psychology.

AMONG truly modern men, that is, among persons who have permitted the basic problems of our time to touch their inner lives, Field Marshall Jan Christian Smuts (1870-1950) stands out as an especially significant figure. He is not a representative man, but a prototype of modern man moving out of traditional dualistic conceptions to a holistic way of thinking. With his wide range of involvements in contemporary affairs—military leader, prime minister, collaborator with Woodrow Wilson in founding the League of Nations, author of basic statements in founding the United Nations, Chancellor of Cambridge University—Smuts was especially sensitive to the human needs of modern times.

Among all his accomplishments, however, one that is very little known seems to me to be the most meaningful for the future. He had a vision of what a holistic depth psychology could one day become and what it could achieve for modern man. He envisioned a new kind of science of personality—a kind that was not contained in the psychologies of his day and is only beginning to be appreciated in our own time.

And his schematic studies of man's place in evolution were intended to provide the large perspective in which what we can today call a *depth psychology of wholeness* would become a scientific possibility.

The core of Smuts' personal quest for understanding concerned the problem we have mentioned as the starting point of modern thinking: How is it possible that man derives from the animal kingdom and yet is inherently a creative, spiritual being? Smuts was not interested in this as a merely intellectual question separated from life. It was a matter of necessity, of deep personal concern for him. The purpose of the knowledge he sought, no matter how abstract it turned out to be, was specifically to resolve his questions as a human being living in modern times, and especially to assist him in the process of growing as a person.

While he was still a law student at Cambridge, Smuts became engaged in the line of investigation that was to culminate in his major book, *Holism and Evolution*. It was as though, even in those early days, Smuts was already anticipating the needs of the creative growth that was to be the continuing principle of his mature life. He was in fact searching out the principles that would make it a practical possibility. Thus, in Cambridge, the direction of his inquiry led him to investigate human personality to see how it unfolds and matures in the world of nature and to find its ultimate meaning and potentialities.

He understood by *personality* not a superficial facade of sociability that would help him "influence people" and achieve worldly success, but the inner capacities latent in the nature of personality as a creative entity in itself. He was interested in coming into contact with the essential core of being in man, believing that to develop this would bring to realization the fullness of personality that is the crowning result of natural evolution.

It is very useful for our understanding of modern thought to observe how Smuts went about his search. If he had lived in a premodern period of history, he would very probably have approached his question in terms of God and the divine as the creative principle in man. But since Smuts was born toward the close of the nineteenth century A.D. (After Darwin), he could not take traditional religious conceptions as his starting point. He could only begin with the view that man is a part of nature, and then undertake to find in the structure of man as an animal species those qualities that eventually emerge as that intangible creative factor which Smuts called *Personality*.

Starting with this general view, he needed specific case material; and the life and writings of Walt Whitman seemed admirably suitable to his purpose. Whitman's work might not be universally accepted as superior poetry—and in Smuts' day Whitman was far out of favor in the literary circles of England and South Africa. But what was important to him was the nature of Whitman's spiritual experience and perception, for the quality of his personality exempli-

fied the principle of Personality that Smuts was trying to understand and to make real in himself.

He had found a kindred spirit in Whitman, one who had touched the profound unity of life and had merged with it in the depths of his being. But Whitman, as an individual, was to be regarded only as a special case of a general principle of emergent personality, a principle that might be found to be operative throughout the process of natural evolution and in the human species in particular.

The wholeness of creation, the fullness of evolution, finds its meaning and fulfillment in the individual human personality. This was the lesson that Smuts drew from Whitman's experience; and he carried it further into a larger, more comprehensive formulation concerning the nature of evolution in general. He had written his Whitman manuscript in 1895. In 1910 he made an attempt at expressing the larger theory in a manuscript entitled, "An Inquiry into the Whole," but this also was never published. Only in 1924 when he suffered his major setback at the polls and was retired as Prime Minister did he have an opportunity to work out his holistic conception of evolution in its full scope. This was published in 1926 as *Holism and Evolution*.

**I**N *Holism and Evolution* Smuts presented his conception that the tendency to form new wholes—ever more advanced unities—is a main characteristic of the evolutionary process. Further than this, he pointed out, a special case of this tendency toward the formation of wholes is the emergence of human personality out of the evolution of animal forms. Personality represents the highest point of development, the most advanced whole, to be produced by the process of natural evolution.

This line of thinking took Smuts to the point that was the real reason for his search. Personality has emerged in the course of evolution, and it is the distinctive characteristic of the human species. It is the special sign of the *whole-ness* of the human being. Yet there are apparently many different gradations in the quality of personality that can be developed in specific individuals within the same species. Personality is a tremendous potentiality in man, but there is a very wide variation in the degree to which its promise, present innately in man, is fulfilled.

This brought Smuts to the question to which all his study of evolution had been leading: What principles and techniques are there for drawing forth the largest possible development of personality in man?

This is essentially a psychological question, but it is not the kind of question with which traditional psychology has been concerned. And yet it seems to be of an importance that overshadows virtually all the other fields of psychological study. Our time in history urgently requires an understanding of the workings of the human personality that will enable modern man to fulfill and draw forth more of his



potentialities. This applies to the creative activity of scientists working now to reach into the secrets of nature; and it applies also to those scientists of the spirit who are working to penetrate the labyrinths of the human soul to reach by means of it additional dimensions of experience.

This subject matter seemed to Smuts to be of such great importance that he suggested that a separate discipline be established in order to study it scientifically. In the large perspective of life which he developed, human personality emerges as the crowning result of evolution. Its fullest possible development is therefore the highest goal to which man can aspire, and the most notable study to which he can dedicate himself. Smuts suggested that a new science be established under the name of "Personology" to investigate the personality development of those who had achieved the highest realization of individuality and spiritual competence in their lives. Studying them empirically, Smuts felt, we would soon possess a "science of personality" capable of fulfilling the larger potentialities and aspirations of mankind. This would be "the synthetic science of human nature;" that is to say, it would not dissect man and diagnose him analytically as the psychoanalytical disciplines do, but it would concentrate on drawing forth the capacities of his wholeness. It would be, Smuts said, "the crown of all the sciences."

The older forms of psychology were much too circumscribed to be able to contribute to this work; and so Smuts envisioned a new kind of psychology that would address itself to the goal of creatively developing the human personality. Now it is interesting for us to note that in the years since Smuts wrote, something very similar to what he prophesied has slowly come to pass in the field of depth psychology. While depth psychology began with a medical emphasis in the psychoanalytical work of Sigmund Freud, it moved in quite different directions in the later and advanced thinking of Alfred Adler, C. G. Jung, and Otto Rank.

WHEN one traces the cumulative growth of insights in the main creative authors of depth psychology, as I undertook to do in writing *The Death and Rebirth of Psychology*, one soon realizes that in the great ferment of its thinking during the past half century depth psychology has been subtly transforming itself from within. It found itself less and less able to follow its original diagnostic attitude, cast as it was in terms of medical materialism; and it has been drawn more and more in the direction of a holistic orientation.

The net result of the works of such authors as Adler, Jung, and Rank has been to lay the foundations for a new kind of psychology, a psychology whose basic conception of man is as an organism of psychological depth and of spiritual magnitude. It is a kind of psychology that is quite in accord with the goals and direction of study that Smuts had recommended. We may therefore speak either of a science of "Per-

sonology" as Smuts did; or, perhaps more meaningfully, of a growing science of *holistic depth psychology* which would bring a new dimension to the study of personality by applying the depth understanding of man in a holistic perspective.

The question then arises of what materials of study will enable us to fulfill the goals of a holistic depth psychology in a scientifically acceptable way.

Mahatma Gandhi, in his monumentally revealing autobiography, spoke of his "experiments with truth." That phrase has a metaphysical sound, and the personal work that it involved together with its practical political consequences certainly had a religious significance to Gandhi. But the dynamic core of what Gandhi was doing was psychological. He was engaged in a work of inner discipline which he practised throughout his mature life in an effort to develop the capacities of his personality to the highest possible level.

Gandhi's personal aim was to achieve the fullest possible utilization of the faculties of his psyche; and in order to reach this goal he had to proceed as best he could, using this technique and that, prayer and fasting and meditation, and whatever other procedure was suggested to him by Hindu tradition, or by his knowledge of Christianity, Buddhism, and Mohammedanism, as well as by modern authors like Tolstoy and Henry Thoreau.

Gandhi's work was experimental in a very rich sense of the word, for he tried all kinds of measures and methods, varying and altering them to find pragmatically what seemed to work best. The creative core of Gandhi's life thus comprises essentially a continuing discipline of psychological experiment conducted within himself.

The psychological goal of these experiments was the development and use of the latent faculties of the psyche, faculties which remain dormant in most human beings and are seldom awakened at all. Gandhi interpreted these psychological entities in terms of his spiritual frame of reference, and he felt therefore that what his inner experiments were achieving was to bring him closer to God and to enable him to utilize "Soul-Force" in the world of men.

In *The Cloud of Unknowing* we find something very similar. There, experimental, psychological techniques conceived in religious terms are practised in order to reach a fuller development of the faculties of the personality.

Those persons in prescientific times who undertook the task of experimenting within themselves in order to enlarge their constitutional capacities of experience had to follow a procedure of trial and error until they could reach conclusions that would rest upon an empirical base. They were working experimentally with themselves, but they could not do their experimenting in the laboratory. Their personal lives had to serve as their laboratories. This, we should note, did not involve a sacrifice for them, but rather a commitment and a faith. They believed, as the

modern holistic psychologist should believe within his own frame of reference, that the work of enlarged personal development is a main road to the realization of meaning in life.

The prescientific experimenters in personality development turned their attention to what is the fundamental datum of psychological study: the processes of the psyche as it pursues its natural course of unfoldment toward wholeness. They were thus concerned with the experiences that take place within the holistic depths of human nature. They followed, in order to fulfill the purposes of their work, an experimental point of view.

They could not "control" their experiments in the modern sense. They could not repeat at will their "experiments in truth" with a single variable factor at a time. But they were able to observe the effects of their practices upon themselves, and within themselves. And they were able to discuss the effects of these practices with other individuals engaged in the work, comparing the results with one another, sharing their observations and pooling their knowledge. It was thus that errors in the work could be eliminated; and though each "experiment" was individual, necessarily being limited to a single personality, the net result in each of those disciplines where there was some group continuity in practice was a crystallization of procedure that embodied an impartial consensus of judgment based upon trial and error.

In the course of the centuries during which men in various cultures and religious traditions have undertaken and recorded this kind of personal experiment, a considerable literature has accumulated. Taken together they comprise a large and fertile source of data for the empirical study of the depth processes of the psyche as experienced by individuals who approached the subject experimentally in the context of their particular symbolic view of the world and of reality.

**T**HIS is the point at which we in the modern age with the intellectual equipment of a sympathetic depth psychology are in a position to make a substantial advance over the haphazard personal experiments of earlier generations. Since we have the accumulated records of the past available to us we can study them objectively in the light of our modern depth conceptions with an awareness of the timeless significance of their original spiritual concerns. Now, with our fuller insight into the many dimensions of psychic symbolism, we can undertake to decipher their esoteric meanings in terms of the underlying processes in the holistic nature of man. We can then, using these written records as our empirical data, study them comparatively and critically so as to emerge eventually with a body of significant hypotheses conceived in the spirit of science. Many of the necessary materials have already been assembled by such eminent authors as Mircea Eliade, Pitirim Sorokin, and others; these provide a substantial founda-

tion for a new scientific discipline that can make an important contribution both in its theoretical insights and in its techniques of personal practice.

**W**E have said that this new field of study can best be described as a *holistic depth psychology*, but it may be necessary for us to clarify what the word *depth* implies. In its psychological usage *depth* refers to the *unconscious*; and the traditional psychoanalytical understanding of the unconscious depths of personality refers to mental contents that have either been repressed or inhibited from reaching the higher level of consciousness. This is a negative understanding of psychic *depths*, one that is conceived in terms of the pathology of personality.

The holistic understanding of *depths* in man is conceived from an opposite direction. It does not think in terms of the malformations of personality, but rather in terms of what man's nature requires him to become. As of all animal species in evolution, the essential characteristic of the human organism is its spontaneous capacity for growth. Hidden in the depths of man there are indeed personal repressions and inhibitions; but of much greater consequence are the hidden propensities to growth which set the direction and possibilities of human development.

As the oak tree lies hidden in the *depths* of the acorn, so the wholeness of human personality with its fullness of spiritual and creative capacities lies hidden in the *depths* of the incomplete human being silently waiting for its opportunity to emerge. The role and purpose of holistic depth psychology is to describe the possibilities hidden in the depths of man, to ascertain the processes by which they unfold, and to devise practical procedures with which to expedite and enlarge the natural growth of personality.

Jacob Bronowski has defined science "as the organization of our knowledge in such a way that it commands more of the hidden potential in nature." In this sense, holistic depth psychology can become man's crowning science; for its very form and conception dedicates it to the development of more of the hidden potential in the nature of man.

**A** science of man conceived in these terms would fulfill the basic need of modern man to understand the unity that links his animal nature and his spiritual aspirations. They are not separate entities as has often been thought. They simply represent different stages in the inherent process of evolutionary growth. Those individuals who have carried the evolutionary process further than nature herself has brought it, who have continued the process of evolutionary growth within themselves by the use of special knowledge and disciplines, are prototypes of the creative spiritual being that modern man can become. They are instances of what Smuts speaks of as "holistic personality," and in them the ageless surgings of evolution find their finest fulfillment.

The lives of such individuals throughout history, the procedures they followed in their development, and the principles of growth involved in their lives are an important subject of study for a holistic depth psychology. But what is of underlying and, we may say, of transcendent importance is its frame of reference which enables it to understand the affirmative spiritual achievements of man against the background of basic biological processes. With such a unitary point of view, man can truly be in touch with the fullness of his creative resources. And where he slips out of touch with the holistic depths of himself, he can be returned to it by following, perhaps with the assistance of another holistically oriented individual, the organic processes of growth that are inherent in the psyche of man.

We find, then, that since the holistic depth psychology of which we have been speaking is oriented not to pathology but to the unfolding human personality, its procedures are not negative and diagnostic, but constructive and affirmative. Their answer to what has been labelled as "neurosis" in the medically centered psychologies of the past is to draw forward the processes of spiritual growth that have gotten bogged down in modern man. Holistic depth psychology, moving from Darwinian evolution to the frontiers of spiritual growth, brings, on the social level, the resolution of a basic and persistent problem that has dogged the modern mind; and on the personal level, it brings procedures for attaining holistic growth in the individual personality.

**I**N the modern world the traditional symbolic beliefs have broken apart. This is so both on a historical level in society, and on a personal level for the individual who lives within society. The modern human being finds a psychological vacuum within himself just at the point where it would be most necessary for him to be able to feel some real and true meaning of an ultimate nature capable of connecting him to life. This breakdown in the old symbols has been pointed out by many authors, by Arnold Toynbee and Paul Tillich, by Sorokin and Buber and Mumford, and by Otto Rank and C. G. Jung among others.

In our context it has a particular significance. The psychological use of deep, unconscious symbols is that they provide a framework of meaning with which the individual can relate himself to the external world. With such symbols strongly felt and believed in, he has a ready frame of reference, a criterion for meaning in his life. But without such symbols, the individual is without any inner guidance, without orientation, and without a connection to life.

Historically it has come about that since these symbols have been broken apart by the transformations in our industrial culture, the typical modern man finds himself spiritually rootless, socially adrift, and without a secure point of anchor for the fundamentals of his life. He may not recognize this con-

sciously; but if he does not, it is because he does not dare. Instinctively he feels himself to be incapable of taking his true situation into account, for the psychological resources he would need to come to grips with it have been taken away from him. And so, since the modern man is out of touch with the natural factors of personal growth within himself, he feels at a loss. He feels as though he really were without psychological resources.

Essentially the modern man *does* accept the materialistic myth about himself and so he does believe that he is empty as a human being. He is not aware of the holistic seed within his organism, and so he permits himself to be filled by all the fads and slogans and useless desires that can be manufactured and sold for a profit. And if he seems to be filled by the mass culture and the mass consumption of advertised products, it is only in order to be filled to distraction. He is thereby distracted from himself, still further separated from a sense of his own identity, and left without an awareness of the capacities latent in the holistic depths of his individuality.

I think it is worth noting that the totalness of totalitarianism is not possible unless the individual human being is considered as a cipher, as nothing. Our modern industrial civilization has contributed to this, and the breakdown of older traditional symbols that once had a mythological force and truth has made it psychologically possible for this condition to prevail. And so it seems that if we are to have any way of approach in the study of man that will be capable of overcoming the effects of modern totalitarianism, whether of the political or of the commercial type, it can only be in terms of a conception of man that recognizes his magnitude, that investigates the points of his connection with the cosmos, that regards the human being as an organism whose inherent nature requires spiritual growth towards wholeness, and so reclaims the individual and restores the psychological faculties and resources that have been neglected in modern times.

It may well be that a holistic depth psychology, as envisioned by Jan Christian Smuts and fulfilled with the insights supplied by Alfred Adler, Jung, and Rank, may take a long stride toward meeting this central, recreative need for modern man even within the present generation.

---

Dr. Ira Progoff is the author of *The Death and Rebirth of Psychology*, *Jung's Psychology and its Social Meaning*, and the modern rendering, with psychological commentary, of *The Cloud of Unknowing*. He conducts a private practice in Depth Psychology in New York City and is a member of the faculty of the Graduate School of Drew University.

This article is based upon an address delivered before the Colloquium of the Drew University Graduate School. It appears, in part, in Dr. Progoff's forthcoming book, *Depth Psychology and Modern Man*. (Julian Press).



# MAN, ENERGY AND THE LIFE PROCESS

Halbert L. Dunn

## Man as a Manifestation of that Universal Called Energy

### *Energy Fields and the Oneness of Life*

**I**NDICATIONS are ever more apparent that mankind now faces either the annihilation of that degree of civilization so far attained or the emergence of a society of truly civilized men. The maintenance, for long, of any stable middle position through the precarious balancing of the gigantic forces now at play in the world seems most improbable.

Due to the rapid advance in the physical sciences, the leaders of nations and of the various economic, social, and religious institutions of our world now have command over sources of knowledge and channels of communication sufficient to control the great masses of people. Unhappily, authority as it is exercised in our world today—whether social, economic, racial, religious, or political, and to an ever-increasing degree—tends to use the leverage of its particular position of power for its own ends. It would appear, therefore, that if society is to be oriented toward improving the world for mankind as a whole, a *growing and tolerant ethical philosophy* must emerge—and soon—capable of guiding and influencing the everyday living practices of people and of fostering a favorable environment for freedom of thought and creative activities.

The paradox faced by man is that the pathway toward this goal is blocked by deeply held beliefs, which historically originated as postulates and assumptions of truth, but which through long usage and cultivation have become fixed in his mind as absolute truth—roadblocks standing athwart the pathway of his own progress and of world peace.

Since, in our present-day atmosphere of cold-war rigidities, the findings of the physical sciences appear to be the *only* thing on which mankind can agree and which he universally accepts, a uniting philosophy or ethical culture in order to be universally acceptable would have to be rooted in or aligned with the fundamentals of science—the same science which is now transforming the physical world for mankind.

It is the purpose of the present paper to develop the thesis that such an idea is not at all far-fetched, but is, on the contrary, actually within reach if we but seize the opportunity to use it as a weapon for waging peace.

**I**T is the view of the author, and admittedly it can be only a hypothesis at this stage, that a firm basis for establishing a universal philosophy for living will be found in a vastly expanded knowledge of the laws underlying the characteristics of energy.

The "oneness of life," a concept broadly held by Asiatic peoples, would seem to be literally true when based upon the laws of energy. The essence of the life process in all its forms would seem to consist of energy systems so organized that they can take energy from the physical environment under the ordinary conditions existing on earth and transform it into energies which can be used to build the organizations which are living creatures.

### *Major Classes of Energy in Man*

**T**HERE seem to be at least five major classes of energy contained within the body of man, i.e.: Energy which is bound into matter; energy bound in form; energy bound in communication; energy which is held in special reserves for special purposes; and expendable energy which is neither bound nor spent, and which is constantly available for use in satisfying whatever needs may arise.

Since the advent of the atom bomb, no one would seriously question that huge amounts of energy are bound into matter. The corresponding atoms and molecules which make up matter are the same whether they are contained within the human body, a tree, a granite cliff, or the air we breathe. If the energy bound in the matter which is contained within the human body could be released in much the same way as takes place within the bomb, the effect, proportionately to the quantity of matter involved, would be fully as devastating as that of the bomb. But the life process cannot release energy thus bound into matter, since this would require temperature ranges in which life cannot exist. Even at death, the matter contained within our bodies is apparently not broken down to its energy components but escapes as matter and becomes incorporated into other substances, both



living and nonliving. The nitrogen of our bodies ultimately returns largely to the world of plants and is reused by the life process. The carbon of our bodies upon cremation largely becomes carbon dioxide and is released into the air where it then, in turn, is used by green foliage of trees and vegetation to extract more energy from the light of the sun for the purposes of the life process.

Evolution is the history of the life process as it builds energy organizations into increasingly complex and specialized life forms. As matter was organized into form, protoplasm emerged and life was born. Single cells became increasingly complex which led to the linking of multiple cells into more efficient, cooperative commonwealths of interests. Systems of specialized cells were formed, and, at length in the process of evolution, mankind emerged as the dominant species. Billions of cells are knit together within the human body and are operated as an organized whole. Each step in this complex building process requires energy which must be used in huge amounts to create and maintain form in tissues. After death, this type of bound energy gradually disappears. At the moment of death, that part of the energy which holds the body together as a whole is dissipated. Then the systems break down into their components, and eventually the cells decay into nonliving matter. Some tissues give up energy bound into form more quickly than others. The bony skeleton appears to be the last to go, lingering on for hundreds of years and, under especially favorable conditions, for thousands of years.

Energy bound into communication is peculiar to the life process. Perhaps it is this type of energy which controls the living organism as a whole and is dissipated in a flash at death. One of its characteristics is that it must be instantly available but cannot be used without being currently replaced. For instance, the energy which binds a memory into the nervous system flashes its message to the conscious mind—yet the memory remains within the brain, which would seem to imply that it has been replaced by an equal quantity of expendable energy. Communication energy is bound into the substance of all protoplasm. Every cell of the body can "remember" in its own way. Pain can be buried in the tissues. Cells can remember hunger and become sensitive to chemicals. The life process at every point requires memory and communication.

Massive amounts of energy are transformed by the body into special chemical substances, many of which are tucked away in special accounts to be drawn upon as needed for special purposes. Some of these—fat, for instance—are bound into form giving rise to the curves which shape the body form. Others, such as the enzymes, are akin to expendable energy in mobility, expanding and contracting in accordian-like manner and with lightning rapidity, thus furnishing

the surface needed for energy transformation.

Expendable energy is fluid and can pass throughout the body at great speeds. Like a well-charged battery which can hurl its energies to flash a light or start a motor, the expendable energy in the body can be used for any purpose. Turned outward, it enables one to perform his daily tasks. Turned inward, it restores the gastric juices used up by digestion of a meal or builds form and substance into the growing child.

The portion of expendable energy which does not become bound and is not yet used to perform work is given a special name—tension. There is always tension in the body as long as the life process continues. Just as the battery without a charge is dead and can no longer do the work for which it is designed, so also the human body, without tension, becomes unresponsive and dead to its environment. The capacity to work, which is energy, disappears at death. As tension increases within the body, increasing amounts of energy must be used or the body can become overcharged. High tension can be most useful at times. Turned outward into work or creative expression, it is called vigor or vitality and is highly prized. Turned inward, it can fashion the body substance of the growing child, build the reserves of stored energy needed for special purposes, and renew the energies bound into communication which are constantly being used in the process of living. When barriers of frustration exist or massive stress and strain have disrupted accustomed channels, high tension can tear at the bound energy of the body, resulting in illness, incapacity to perform useful work, and ultimately in death.

The various types of energy within the body are ever changing and clamoring for reinforcement from outside energy sources. The body as a whole is hungry for energy. If it cannot get energy in sufficient quantities for its daily needs, it turns inward, searching out the hidden reserves of glycogen and fat. When these are exhausted, it begins to tear down the more unimportant body structures in order to sustain those vital to life itself. On the other hand, even when the body is surfeited with energy, it does not always stop of its own accord in its quest for more energy. For example, it may require a considerable degree of intelligent control to halt overeating and overweight.

### *Energy Fields and Man*

IN order to understand how the body functions as an energy mechanism, i.e., a mechanism made from energy and functioning as a transformer of energy which it extracts from nature and directs toward its needs and purposes, it is worth while reviewing how the smallest units of matter operate and the characteristics of an energy field.

Each unit of energy bound into matter, the atoms and molecules contained within the body of man, has its own energy field. The energy field of each atom is relatively vast in its dimensions and binds within it huge quantities of space. To gain some idea of the relative distances involved, imagine the nucleus of an atom to be a mile in diameter. The electrons held by its polarized, electrostatic field of force would be whirling about the nucleus approximately a hundred thousand miles away from it. Yet all this vast reach of space would be ruled largely by the influence of a single energy field.

As atoms are built into molecules, new energy fields are created with polarities of their own and with new reaches of space bound within them. These energy fields overlap and interpenetrate each other. For instance, the energy field of an atom under certain conditions moves about or moves through the energy field of a molecule and in its course undergoes and causes certain stresses and strains to the containing fields of influence. It is probably through just such a process that the fundamental quality of uniqueness first becomes apparent. Some of the electrons at the periphery of a particular energy field are torn away and, since energy can never disappear into nothingness, join up with other break-away units of energy to form new energy organizations, with new polarities and new fields of influence. Thus it becomes apparent even in the case of the atom that creation of new forms of energy organization resides in those elements which deviate most widely from the centrifugal forces of an energy field and that it is the clash between energy fields which makes it possible for "uniqueness" or "deviation from the normal" to create new types of energy organizations.

The energy bound into form, together with new reaches of space brought under control, is essentially an extension of the building process. We know that the building blocks for the nonliving substances which we regard as matter and form in the earth were produced in the favorable environment of the terrifically high temperatures of the sun. The magic of the life process is that it has found a way to remove energies from the physical environment under the ordinary temperature conditions which surround us and recombine them into energy organizations of increasing complexity and efficiency.

In complexity of organization, man at the present moment stands at the apex of the building process of life. But it is evident that complex living organizations cannot remain static and survive for long. Either such emerging energy systems must enhance their efficiency and complexity, or else they will inevitably lose ground, retrogressing toward the frozen immobility of lifeless forms.

The building unit of life is protoplasm. The molecular aggregates and chemicals bound into protoplasm have discovered a formula which is able to extract

energy from the environment and use it for its purposes at a range of temperatures which do not destroy it.

From protoplasm, the basic building unit in the form of a living cell, is built all life. Man emerges, perched precariously at the apex of this life process. He is master of the larger animals of the world but is frequently in open warfare with the tiniest of living structures, in particular the viruses. As Piddington points out,<sup>1</sup> the viruses and microbes are the likely winners in the contest, unless man curbs his own reproductive energies and respects the life processes essential to ecological balance.

### *The Challenge to Social Man*

CAN Social Man, with all his genius, his violence, and his unpredictability, remain sufficiently flexible and adaptable to rule and direct the life process itself? This is the supreme challenge posed to man which must be faced by man if he is to survive.

Since life is a building process, man must come to understand and to follow the laws of energy which are involved in the creation of new energy organizations of life. For example, war is hostile to the life process, and, consequently, man must wake up to the fact that it can no longer be used as an instrument of national policy. In place of war, communication energy must be released in much greater quantities than at present, since this is the pathway to understanding and is consistent with the creative powers of the life process.

Uniqueness and similarity are both essential to the life process. It is not merely that inventive people are needed for their uniqueness in order to achieve social progress, but also that the inventiveness and uniqueness existing within the nature of every person should be fully developed. The person who is now recognized by society as being creative is usually one so strongly oriented toward his uniqueness that he finds a means of self-expression in spite of social obstacles. However, every person needs to express himself creatively and in a unique way, if he is to find his own self-fulfillment in life. Obviously this must be accomplished, by and large, within daily living. It calls for a pattern or design within our social institutions—the family, community, church, business, and the nation as a whole—which provides an atmosphere compatible both to uniqueness and to conformity.

"Impossible!" you say. Not at all! These are simply the plus and minus poles of an energy field. What is impossible is *not* to have both poles represented in a particular energy field. Each individual, regardless of how nonconformist his nature may be, must become a *responsible* member of the groups within the

<sup>1</sup> *The Limits of Mankind*. By R. A. Piddington. Bristol, England. John Wright & Sons, Ltd., 1956. 153 pp.

society of which he is a part. Likewise, it is necessary for each group, whether it be a family or a nation, to respect and to cherish the uniqueness of its members, since each is a potential creator of mankind's future. Responsibility and uniqueness within the individual are a polarity. All of us need to understand this fact and to nurture both poles of influence. Stability of the personality requires both qualities.

Stability also calls for a continuum of adjustment in daily life. Maintenance of balance in the life process is a shifting point of equilibrium within the energy fields of the total environment through which the individual moves. Since everything around one is changing all the time, balance cannot be maintained by the individual unless the point of energy equilibrium within him is able to accommodate itself freely to the changing conditions. How foolish to wear a fur coat in the heat of summer, making the body work harder to stay cool! Yet it is equally nonsensical to cling stubbornly to fixed beliefs when faced by contradictions calling for their reexamination and, if necessary, adjustment. When one clings blindly to beliefs or prejudices in the face of contradictions which challenge them, stresses are set up in the energy systems of the individual, and unbalance is produced which prevents realization of the full potential of which he is capable. Moreover, rest, leisure, and self-adjustment, the elements essential for maintenance of balance, are at the opposite pole from the focus of tension, which in energy terms is where the spirit of man resides.

The point of equilibrium between the interrelated and interacting energy fields which is balance, with its absence of strife and haste, is a favorable matrix for sensitive awareness, understanding, insight, aesthetic appreciation, altruism, and love. Rarely can depth of understanding with others be arrived at in the rush of a busy day. Intuition usually comes from mental processes which are not focused on a problem but are free to flit in carefree adventurings wherever interest or beauty may beckon. The strongest humanities spring from this state of balance, ripening through appreciation of mutual interests into companionship and love. Balance is the womb of freedom for man. It starts within one's self as an adventure usually unfettered by the intensities of high tension focused on action programs.

To maintain harmony between the activity of the day and the repose of night, between the shifting focus of the spirit and the relaxation of untroubled balance, it is essential to keep open the channels of communication. The life process binds large quantities of energy into communication requirements, for it is a voracious user of data and information in its restless, unending quest for answers. Religion, defined in the sense of a search for ultimate answers, can be advanced by the life process only with the free flow of communication energy. Consequently, the life

process itself must have access to data in order to fulfill its purposes. This involves open channels of communication, self-value, and self-adjustment through facing contradictions to one's beliefs as they arise; and self-integration by proving and improving one's values through experiences and full participation in the activities of daily life.

It is precisely in relation to the energy law of communication that Social Man sins most deeply against the emergence of the life process. "Authority" is in charge of social mechanisms. It has its own "ax to grind." It tends to teach the favored facts and views and to ignore or conceal the unfavored. It opens wide the channels of communication to the "pros" but too often attempts to close off those which lead to the "cons."

If the cells and tissue systems of our bodies operated in the same fashion as Social Man, the various types of tissues and glandular substances would organize as pressure groups to present favored views and attempt to cut off data needed by the individual to solve, in the best interests of the body as a whole, the problems facing him. Inevitably, body, mind, and spirit would sicken and die in the resultant chaos of the conflicting energy fields set up. Unless the true significance of open channels of communication in the life process becomes broadly appreciated, Social Man is spelling out his own doom.

#### *Man's Insensitivity to Positive Polarity and Space Needs*

**T**HERE are two other principal ways in which Social Man violates the life process—his lack of appreciation of the role played by positive polarity and his lack of appreciation of the requirements of space within the social structure.

(a) *Positive polarity needs:* By and large, the people of the United States are no longer fighting for something, that is, unless one regards fighting to keep the status quo as fighting for something. On the whole, we are a complacent people. We like our lot in life. We are comfortable and reasonably secure. Consequently, our reactions to situations tend to take the form of being *against* anything which threatens our peace of mind or upsets our favored position.

Energy systems, however, from the atom upward, are polarized. There is a positive and a negative pole. The life organizations of energy are no exception.

This fact of polarization is enormously important in the creative function performed by the life process. It is important *because* uniqueness in a polarized field takes on direction and tends to link up with "like-minded" uniqueness going in a similar direction, thus building toward a constructive and improved pattern. The emergent form of energy organization will likely be ethically oriented—i.e., something favorable to the

life process. Uniqueness, in an energy field which is at cross purposes with the broad objectives of humanity, is likely to create new energy designs that are hostile to the needs for an emergent pattern of organization favorable to mankind as a whole. When the polarity of a particular social design is directly opposed to the broad objectives of mankind as a whole, the resultant, if backed by great force, can become destructive to the life process itself.

(b) *Space needs*: Few persons, reading Piddington's *The Limits of Mankind*, can fail to realize that space limitation is fast becoming the decisive factor in man's destiny and that space rather than food or resources is the ultimate limiting factor to population growth. As man becomes more mobile, his need for space per individual becomes greater, not less. The space sufficient for a pedestrian, agrarian people is quite insufficient for a corresponding number of jet-age oriented individuals.

Other forms of life compete with man for space. The wild forms of mammals, for instance, must have wilderness space if they are to survive. Even the most ferocious of animals are allies of man in his never-ending struggle with the high fertility of smaller forms

of life. In fact, already the spread of man in total numbers and the spread of urban living and civilization's culture are upsetting the ecological balance of nature in a variety of fundamental ways. Species after species of larger animals are being obliterated by man, and, like the mammoths of historical times, will never be re-created by the energy forces a second time in view of the changed conditions now existing.

### *Energy in Relation to Life*

THE life process is a user of energy and must have a sufficient source of energy available to it in order to survive. Man, at the apex of the life process, has a biological, cultural, and conceptual heritage which is his by birthright. Each person who lives the life span goes through the process of growth, maturation, metabolism, aging, and death. The measure of the individual man's vitality, survival, maturity, and his contribution to the human race is governed by the laws of energy.

*Man is a child of energy* and must live in a way consistent with the laws of energy.

Dr. Dunn is Chief of the National Office of Vital Statistics in the U. S. Public Health Service. The article is condensed from an address given at the School of Public Health, University of North Carolina, Chapel Hill, on March 14, 1958, under the title, "Building Toward a Universal Philosophy of Living." A complete text of the address can be had by writing to him at 7631 Fort Foote Road, Washington 22, D. C. The concept of a Universal Philosophy of Living is developed more fully in the book *Your World and Mine*. (N. Y., Exposition Press, 1956).



# DISCOVERY OF THE GIFTED CHILD

Henry Winthrop

## New Materials and Techniques for the Early Detection of Unusual Intellectual Ability

### Introduction

AT the present time, as a result of the prominence given to Russia's educational exploitation of outstanding students, there has been considerable national concern over the establishment of a program for discovering individuals of unusual intellectual ability. The intent is to interest such students in science and mathematics, and to encourage them to enter fields in which shortages of talent now exist. Such a program would have a double purpose, namely, not only to match the number of scientific and technical intelligentsia which Communist Russia is producing, for the sake of our national military preparedness, but also to accelerate the rate of scientific and technological advance in this country. Since some of the unfortunate educational developments of the last three decades have tended to reduce the interest of students in both mathematics and science, educators and statesmen are currently suggesting ways and means to reverse this trend.

Central to the problem is the need to devise suitable methods for detecting individuals of outstanding ability as accurately and as early as possible, so that proper encouragement and support can be offered well in advance of their professional training. Traditionally, the methods for such detection have involved the use of intelligence tests, supplemented by batteries of aptitude and achievement tests, plus school records. However, there are newer materials and methods available which could aid in the discovery of unusual intellectual ability if their exploitation were so directed. The present paper is an effort to discuss some of these and to offer a few programmatic suggestions for employing them in the early detection of the gifted.

### The Psi Apparatus

THE Psi Apparatus developed by John and Miller (6) is a piece of electronic equipment constructed in such a way as to permit the combination of a number of elements into various logical relationships. The apparatus is built to incorporate the logical relationships of conjunction, disjunction, negation and

implication. In this apparatus the output is equivalent to solving a problem, while the relationships given or derived constitute the input. The information content at any given time is measurable in bits. Problem-solving is measurable in minutes consumed to reach an information state, or in terms of questions asked to reach that same state, or both. The apparatus will yield a picture of an individual's method of work, and his efficiency in the acquisition and handling of information in solving a problem, as well as his consistency and appropriateness of approach. The efficiency with which subjects utilize available information is obtained by a measure of *redundancy*, which is the ratio of *inferrable* questions at a given point in problem-solving to the total number of questions which could be asked at that point. Questions which involve one or two manipulations during problem-solving are called *analytic*; those which involve more than two are called *synthetic*. Questions asked during problem-solving can go from analysis to synthesis, and a measure has been devised to show when these two processes are *maximally* separated. Using this and other measures, constant qualitative characteristics of an individual's problem-solving performance may be obtained. Constant characteristics may also be expressed either in units of minutes involved or of questions asked. Findings indicate that personality factors such as anxiety, perceptual factors such as speed and flexibility of closure, and cognitive factors are all involved in performance.

For our purposes, we should note that grade school children from six to ten have performed adequately on these problems. Since measurement of problem-solving activity yields constant characteristics of individuals, the Psi Apparatus opens up the possibility of detecting unusual problem-solving abilities, even when the individuals tested are relatively young. Moreover, the profiles obtainable are qualitatively different and are correlated with successful achievement in different fields, thus opening up the further possibility of more accurate educational counseling. For example, differences in redundancy of performance occur between those trained in the natural sciences and in the social sciences, in favor of the natural scientists. The social scientists, however, arrive at solutions more rapidly. Important in this con-

nection is the fact that qualitative differences in problem-solving between the two groups are known, from experimental evidence, to be due to factors present before college courses were encountered. Each group, that is, turns in the same performance before as after training. If these constant performance characteristics are subsequently found to be present fairly early, then we have here a powerful method for discovering individuals who possess a high order of problem-solving ability and who constitute first-class material for subsequent training in science and mathematics.

### *The Cuisenaire Technique*

A revolutionary new method of teaching mathematics has evolved in recent years, known as the Cuisenaire technique. A variety of considerations, logical, psychological and educational, has led to the conviction that algebra should be taught before arithmetic. The Cuisenaire technique described briefly by Gattegno (4) involves the recognition that the properties of both length and color can be placed into isomorphic relationship with the properties of numbers. Georges Cuisenaire, a Belgian teacher, developed colored rods of one sq. cm. section which vary in length from one to ten cm. The various lengths can be identified by their colors, which are in turn interrelated so that the mathematical properties of the rods are directly experienced through the senses of sight and touch. It has been found that if children play with these materials and are taught to use them in various ways, they discover a large range of mathematical concepts through a natural involvement of hand, eye and mind in simultaneous action.<sup>1</sup> These materials are utilized by the child in his then present stage of psychological development. The reader is referred to Piaget (9) for his studies of capacities for abstract and symbolic manipulation exhibited by children. Geometrical properties and relationships have also been made discoverable by means of a device which Gattegno calls a Geo-Board. This is a board on which nails are placed to form standard figures such as circles, squares and polygons, over which colored elastic bands can be stretched. These bands can be moved about, so that the displacements incurred will affect all figures and properties.

Research with the Cuisenaire technique shows that elementary propositions of algebra can be comprehended by children of five or six. For our purposes, it is sufficient to point out that the rods and Geo-Boards may enable us to detect rather early those children who possess a great deal of abstract ability and who are able to discover difficult propositions for themselves.<sup>2</sup> This might be done by a standardized type of observational technique involving the use of an agreed-upon check list. What is required is a

recording of the manipulative activities of children from five or six through adolescence, using the Cuisenaire materials, and a code which can translate these into the representative intellectual activities to which they are isomorphic. These should enable us to spot the child who is unusually gifted, particularly the individual with high level abstract ability and mathematical aptitude who is only moderately verbal.

### *Data Processing*

DATA processing in general refers to the task of selecting data relevant to a given problem and winnowing down the possible number of relevant solutions. The importance of the considerations governing selection has been emphasized by Ashby (1). The total activity of data processing has been classified by Bradshaw (3) into five main types of activity: classifying, sorting, calculating, summarizing and recording. In terms of cognitive activity, however, the variation in the efficiency with which different individuals process the same data is related to the degree of intellectual power they possess. Measures of this power are more revealing in some ways than the traditional use of the IQ. For example, "21 Questions" is a game which involves all the activities of data processing mentioned, if we allow "calculating" to include logical deduction. When adults are observed playing this game, it is apparent that a record of the number of questions to solution which characterize different adults would not yield a normal distribution. If we could determine in advance the minimum number of bits of information or questions needed to solve each problem, and measure against this the number of questions required by each person, an estimate of individual efficiency could be obtained. If a large number of persons was used in numerous experiments on different subjects, we strongly suspect that a plot of these ratios would not result in a normal-type curve.

This impression is borne out by some data presently at hand, but not as yet completely analyzed. A game similar in technique to 21 Questions but using visual materials was employed, using retarded, normal and superior subjects. Data-processing efficiency was recorded in terms of questions to solution, and the ratios of questions or bits employed to those actually needed for subjects in all three groups were established. From our incompletely analyzed data, one fact stands out which prompts the belief that frequency distributions of such measures would not be normal. This fact is related to a special type of research pursued by Wechsler (12) with regard to the range of human ability. Wechsler found that the ratio

<sup>1</sup>The properties, relationships, and theorems which are readily discovered by the child playing with the rods are described in the article cited.

<sup>2</sup>As Cuisenaire techniques come into wide use, it will be interesting to see whether a more appropriate educational method and device succeeds in producing less variability in achievement among trainees than is obtained today by traditional methods. A statistically significant reduction in variability would somewhat weaken the position of those who are convinced that individual variability in mathematics is chiefly a matter of innate differences in ability.

of the maximum to the minimum measure of all the human attributes, capacities and abilities which he studied is less than 5:1, while the vast majority of such ratios fall within the limits of 1.3:1 and 2.5:1. If, from our own records, we take the ratios of the average number of questions asked by retarded subjects to the average number asked by superior subjects, we find that it is of the order 6:1 to 7:1. Since the distributions of many of the traits studied by Wechsler barely conformed to normality and in some cases represented substantial deviations, we should expect that ratios falling between 6:1 to 7:1 would yield still greater departure from normality. If this conclusion should prove justified, we could safely assume that individual differences in data processing are larger than individual differences in IQ.

Now the point of all this is that any type of problem which involves measurable data processing for solution, whether similar to 21 Questions or not, may prove to be excellent material for use in the early detection of unusual powers of intellectual organization. It would not be possible at this time to describe that constellation of abilities which enters into unusually facile data processing. However, if such a constellation should prove to be closely correlated with evidence of intellectual achievement and creative power, then problem materials which involve measurable data processing should give a good indication of future performance. The practical objective here would be to select problems and materials suited to children of various ages, designed to reveal the vast range of individual differences in intellectual organization, where these differences are either non-normally distributed<sup>3</sup> or, if normally distributed,<sup>4</sup> give performance ratios which exceed those found by Wechsler. Should such materials ever be developed we could detect children of unusual intellectual power at an early age and thus be in a position to guide their interests in directions where these powers would be most productive, both for the individual and for the community. Accounts of the intellectual feats of men of genius when they were quite young, as described by Terman and Cox (11), fortify the impression that intellectual organization (data proces-

sing) is a more highly variable attribute among human beings than IQ. For these reasons, research on individual differences in data processing and their relation to high-level achievement should be, we think, a *sine qua non* of present plans to give the superior child his educational birthright.

### *Childhood Inventiveness, Originality and Interest*

AN evidence of intellectual power which superior children exhibit lies in the originality of the games they invent and the unusual interests they display. Hollingworth (5) mentions a child with an IQ of 184 who had the following accomplishments to his credit before the age of twelve: 1. the completion of a dictionary of his own neologisms; 2. the publication of a playground newspaper at the age of eight; 3. a statistical study of the frequency of parts of speech occurring in his general reading made at the same age; 4. the invention of a three-handed and a four-handed game of checkers. The same author reports a pair of twin girls, both testing at IQ 183, who at the age of four could read English, French and Esperanto. At age eight they had already read the complete *Book of Knowledge* in French and had started the study of Russian. It is generally reported that the reading interests of the gifted are for history, current events, humor and, especially, science. Gifted children frequently complete encyclopedias, dictionaries and atlases for themselves, and prefer complicated and challenging intellectual games to the more routine play of other children. Louttit (7) reports that Einstein did higher mathematics at ten and read Kant at thirteen, and that Edison at ten read Gibbon's *Decline and Fall of the Roman Empire* and Burton's *Anatomy of Melancholy*. At twelve he had started a successful small business.

These feats have generally been frowned upon by the child's peer group, and have rarely received a warm welcome from adults. The gifted have traditionally suffered social ostracism in one form or another. This has probably been truer of the United States than of any other Western country. Since Sputnik went up there has been a slight but growing concession that the gifted may possibly be something more than a combination of Frankenstein and a leprechaun. We are now willing to accept them as socially cumbersome oddities who may prove to be quite useful in the long run. Even this small change of heart, however, seems to be more confined to newspaper and other editors, who may, themselves, have found Gibbon interesting at twelve, than to the lay public. Antagonism toward the gifted may not be new in our age, but the ability to present high-sounding rationalizations for that antagonism certainly is.

From the standpoint, however, of the problem of early detection of superior ability, it would be valuable to develop a standardized check list of the games, interests, and intellectual and personality traits of the

<sup>3</sup> A Pareto-type curve, which is employed in economics to represent the distribution of income, has also been found applicable to the distribution of certain abilities. The formula for such a distribution is  $y = ax\sqrt{x}$ , where  $a$  and  $\sqrt{x}$  are constants, and where the attribute measured by such a curve is skewed heavily to the right. When such a function is used to represent the distribution of income,  $y$  is the number of people having the income  $x$  or greater and  $\sqrt{x}$  is approximately 1.5. The Pareto-type distribution would be applicable to any attribute large values of which were relatively rare while moderate and low values were abundant. For a discussion of the applicability of the Pareto-type function to unusual abilities, see Davis, H. T. *The Theory of Econometrics*, Bloomington, Indiana: The Principia Press, 1941. xiv. pp. 482.

<sup>4</sup> Our preceding remarks on Wechsler's findings, of course, do not preclude the possibility that ratios of values at the extremes of the range can exceed those he found, even where the attribute measured is normally distributed. This finding is less likely but it is theoretically and practically possible.



superior child, and use such a standard form for locating them. Were such data given by unprejudiced teachers and parents, they might prove more useful than the administration of a battery of tests. Such a check list can be constructed from a consensus of important attributes which are based upon the research findings of psychologists and other specialists who know the extent to which the characteristics of the superior child are almost invariably associated with high achievement. One compilation of what might properly be included in a standardized check list has been furnished by Scheifele (10), to which the reader is referred.<sup>5</sup> One important result of the compilation of such a list, it is hoped, would be to correct the outrageous statements made about the characteristics of the gifted.<sup>6</sup> It would be well worth investing funds in a project devoted to the rigorous construction of such a standardized check list by psychologists and educators, and it could be of immediate use on a national scale.

### *Applications of Game Theory*

IN taking advantage of the superior child's interest in complicated games, one of the richest mines of source material lies in the field of Game Theory itself. This is particularly true because its game aspect can be enjoyed with a knowledge of arithmetic plus a clear notion of a negative number. Since the application of the four fundamental operations of arithmetic, using positive and negative numbers, can now be taught to young children through the Cuisenaire technique, their attack upon many problems of Game Theory is it once possible. If a large sample of young children becomes familiar with the less technical aspects of Game Theory, the superior child could be easily detected through his intense interest in and unusual ability at solving some of its problems. Even where these problems involve a two-person game, a single subject can solve the problem with a knowledge of the strategies available to both sides. These two-person games may also be treated for what they are supposed to be—a game to be played by two opponents, in which marked counters involving positive and negative numbers can be used by both players in strategies against each other. By recording the moves of each player and by analyzing these records somewhat in the same manner as in the case of the Psi Apparatus, it may be possible to define those profiles which indicate very superior performance and keen enjoyment by the participants. If measures of superior performance can be devised which correlate

with known measures of achievement, using adults perhaps for the establishment of norms, then the superior child's interest in complicated games will distinguish him in a group of his peers. Examples of simple two-person games have been described by Williams (13).

The reader who is somewhat familiar with the essentials of Game Theory, and the applicability of the concept of the *mixed strategy*, will immediately recognize the suitability of two-strategy games for the purpose we have mentioned. The fact is there are many short problems that may be borrowed from Game Theory which are within the taxable skills of grade children, particularly if they have had the benefit of instruction through the Cuisenaire technique. Such games provide unlimited possibilities for tapping the ability and interest of the superior child at complicated games. If a Game Theory Inventory could be constructed and standardized, with norms based upon the number of correct solutions given by a typical population of children, and also upon times of solution of different problems, we should have an additional asset for the detection of the superior child.

### *Methods of Intellectual Integration*

THERE is another and more difficult method to be used for the detection of the superior child: the performance of feats of *intellectual integration*. This is an ability which Pareto has referred to as the *instinct for combinations*, and Borkenau (2) has discussed at length. Intellectual integration has many forms, although it will be generally manifested through the content of the writing of the superior child. I should like to mention a few of these forms here. Integration by composition involves the interweaving of two or more different ideas from separate fields into a single theme or focus. Integration by logical extension occurs when an abstract idea, principle or relationship is applied to an area of study or a field of observation to which, until then, it has never been shown to be applicable. Integration by coordination occurs when data from disparate fields are brought to bear upon the solution of a problem which does not lie in either field. Integration by unification involves the ability to show that two types of theses are *logically derivable* from a more central, abstract hypothesis, much in the manner in which field theory research is pursued in physics. It differs from integration by composition, which involves a weaving together by interpretation rather than by logic.

Themes may be assigned to children which are aimed at tapping various types of intellectual integration, of which those mentioned above are not the sole types by any means. If measures can be developed to show the achievement weight to be attached to the different frequencies with which these types of integration appear in assigned themes, and if scales

<sup>5</sup> It is only the intellectual, social and emotional traits of Scheifele's list which are emphasized here. The physical traits of the superior child are somewhat irrelevant to the present discussion.

<sup>6</sup> Among the traits attributed to genius have been the following: alcoholism, narcotics addiction, tuberculosis, mental instability, shortness of stature, sexual debility or impotence, inability to produce other than mediocre children, and the rarity of genius in women.



ults  
su-  
dis-  
of  
by

the  
of  
ely  
the  
are  
om  
of  
the  
ch-  
for  
hild  
ory  
rms  
by  
mes  
an  
ild.

o be  
the  
This  
*in-*  
dis-  
any  
sted  
rior  
rms  
ter-  
rate  
by  
rin-  
y or  
has  
by  
elds  
lem  
uni-  
ypes  
tral,  
hich  
ffers  
es a  
by

are  
nte-  
the  
evel-  
hed  
ypes  
cales

ca  
tic  
je  
pi  
un  
in  
tr  
w  
a  
m  
tr  
ea  
th  
in  
co  
co  
po

sh  
ag  
ac  
be  
th  
m  
sty  
pr  
ity  
mo  
co  
tic  
ser  
hig  
bo  
tur  
as  
tes  
an  
chi  
asp  
dir  
plo

N  
em  
gif  
be  
We  
onl  
suc  
nat  
pos  
be  
thu

De  
ere  
viri

can be developed for rating these types of integration according to their empirical relationships to objective achievement, a further means is provided for picking the superior child from his peers. Such measures can be made completely objective, provided the intellectual achievement of the theme writers on controlled topics is known. The only area of subjectivity which arises in this connection is the classification of a theme under the appropriate integrative label, which may involve a consensus of judgment from persons trained for the task in question. Evidence from the early writing of superior children seems to indicate that a direct measure of prospective achievement in intellectual integration may be possible, freed of the context of style and expression, both of which may confuse the issue and be mistaken for the more important attribute of superior intellectual ability.

Two techniques which also deserve consideration should be mentioned briefly in passing. Many years ago a statistician<sup>7</sup> developed some formulae to characterize the individual's writing style. Such work may be exploitable in the sense that possibly the earlier the individual's style crystallizes, the more gifted he may prove to be. If the constant features of writing style mature early, and if this phenomenon should prove to be related to a high order of intellectual ability, then further research on the statistical measurement and description of style might prove to be of considerable value. The second point in this connection is to note that *syntactical power* in Morris' (8) sense of the word, that is, the power to operate at high levels of multiordinality by manipulating symbols with still more general symbols, is a central feature of high intellectual ability. No psychologist has, as yet, turned his hand to the construction of power tests which measure this capacity *verbally*. Thurstone and others have, of course, tapped it with symbols chiefly of a non-verbal variety, but the *conceptual* aspect has been relatively neglected. Work in this direction would surely add to the test resources employed to detect the gifted as early as possible.

NO pretense has been made in this paper that the suggestions mentioned exhaust the possibilities for employing new testing techniques for selecting the gifted. Nor are we assuming that to be gifted is to be endowed only with abstract, intellectual powers. We have singled out this type of ability for discussion only because it is the one most closely associated with success in mathematics and the sciences. Our pressing national concern at the amount is for individuals who possess such ability. Therefore anything which can be done to spot as many as possible of those who are thus gifted should be a gain for us all.

## BIBLIOGRAPHY

1. Ashby, W. R., "Design for an Intelligence-Amplifier," in *Automata Studies, Annals of Mathematics Studies*. No. 34. Princeton, New Jersey: Princeton University Press, 1956. viii. p. 285.
2. Borkenau, F., Pareto. New York: John Wiley & Sons, Inc., 1936. p. 218.
3. Bradshaw, T. F., "Automatic Data Processing Methods," in Chapter 1 of *Proceedings Automatic Data Processing Conference*. (Held Sept. 8 and 9, 1955) Boston: Harvard University Graduate School of Business Administration, 1956. viii. p. 193.
4. Gattegno, C., "The Cuisenaire Discovery. Notes on a Radical Transformation in the Teaching of Mathematics," *Main Currents in Modern Thought*. Vol. 14 (3), January, 1958. pp. 51-4.
5. Hollingworth, L. S., *Gifted Children, Their Nature and Nurture*. New York: The Macmillan Company, 1926. xxii. p. 374.
6. John, E. R., and Miller, J. G., "The Acquisition and Application of Information in the Problem-Solving Process: An Electronically Operated Logical Test." *Behavioral Science*, 2(4), 1957. pp. 291-300.
7. Louttit, C. M., *Clinical Psychology of Exceptional Children*, New York: Harper & Brothers, 1957. 3rd edition. Chapter 7. xii. p. 573.
8. Morris, C. W., "Foundations of the Theory of Signs," *International Encyclopedia of Unified Science*. Vol. 1, No. 2. Chicago: The University of Chicago Press, 1938. vii. p. 59.
9. Piaget, J., *Psychology and Logic*, (with an Introduction on Piaget's Logic by W. Mays). Manchester University Press, 1953. xix. p. 48.
10. Scheifele, M., *The Gifted Child in the Regular Classroom*. New York: Bureau of Publications, Teachers College, Columbia University, 1953, p. 84.
11. Terman, L. M., (ed.), and Cox, C. M., "Genetic Studies of Genius," *The Early Mental Traits of Three Hundred Geniuses*. Vol. 2. Stanford: Stanford University Press, 1926. xxiii. p. 842.
12. Wechsler, D., *The Range of Human Capacities*. Baltimore: The Williams and Wilkins Company, 1952. ix. p. 190.
13. Williams, J. D., *The Compleat Strategist being a primer on the theory of games of strategy*. New York: McGraw-Hill Book Company, Inc., 1954. xiii. p. 234.

Dr. Winthrop, who teaches psychology at the University of Wichita, possesses interests and training which cut across several areas. He has taught psychology at different academic institutions and worked as a psychologist with various public agencies. His professional interests are primarily in personality theory, social psychology and the philosophy of science. A volume which he recently completed, on the role of value in psychology, will appear in the near future.

<sup>7</sup>Developed by G. Udny Yule, in *The Statistical Study of Literary Vocabulary*, Cambridge, The University Press, 1944, viii, pp. 306.

# SOURCE READINGS: INTEGRATIVE MATERIALS AND METHODS

## Structuralism—Scientific Method

### Applied to Art

THE possibility of applying scientific method to other fields of human endeavor, such as the arts, is something that has been discussed but less frequently carried through. The concept of Structuralism, which has been chiefly developed by Hilaire Hiler, is one of the most successful attempts to make a real connection between science and art. Mr. Hiler, whose work has been appreciated both in this country and in Europe and is included in the Chrysler, Rockefeller and Wilder collections, has recently exhibited his paintings at the Collectors Gallery in New York City and at the Newark School of Fine and Industrial Art.

An evaluation of Structuralism and of the work of Hilaire Hiler is available in a book written by Waldeemar George (Geo. Wittenborn, N. Y., 1958, illus., \$5). In an article entitled "The Origin and Development of Structural Design," which appeared in the Sept. 1956 issue of *The Journal of Aesthetics and Art Criticism*, Mr. Hiler discusses the principal concepts underlying this art form, as follows:

"The possibility of erecting a comparatively scientific method of aesthetics posits a similar possibility of formulating a relatively scientific approach to design or painting. The methods of analysis for one activity may be considered as being at one end of a two-way street. The street leads to the result of the application of methods (similar to those used in aesthetics) to the painting which occupies the other end of this street. This is because scientific method, or at least portions of it which prove useful to aestheticians and to designers or artists, is more or less universally applicable.

"The mature, professional artist-designer must have some knowledge of the contemporary views of science and those of philosophy. He knows that his theory must be operational or suitable for practical and concrete expression. He is aware that former categories such as classic versus romantic or emotional versus intellectual no longer hold good; at least, they do not hold good without frequent use of the qualifying term *predominantly*. Pure romanticism, pure classicism, pure emotion and/or pure intellect can only be separated verbally. In the world of facts no such cleanly divided categorization is possible.

"... most, if not all, so-called modern painting bases its organization upon opposition and similarity. Form and color balance are attained (at least theoretically) by opposing areas for balance through contrast. In contradistinction to this attitude Structuralist design utilizes a degree orientation and employs sequential relationships rather than those of opposition, regarding the design configuration as a con-

tinuum. These sequential relationships which proportionally resemble those found in natural growth permit the appropriate use of the term organic. This fact together with an attitude toward the use of color which is free from asceticism and negative compulsions, differentiates Structuralism from Constructivism and other similar non-objective outlooks.

"... Another distinctive characteristic runs counter to a widely held present-day one. This stems from the attitude of the Structuralist designer toward kinetic or calligraphic quality or to textural qualities as evidenced by quasi-fortuitous brush work.

"Textural qualities are rigidly controlled technically, and vary with the type of color of a given domain. ... Structuralism frankly seeks to use socially accepted systems in the handling of form and color. It is purportedly rational, tectonic, abstract, and, on the theoretical level, traditional. ...

"In the case of Structuralist design it is assumed that the imagination is well furnished and trained to operate *in terms of the medium*. ... The exteriorization of the imagined configuration is realized by programming. The means and method are decided upon and the project carried out with consciousness of assumed context, of abstracting, of concrete and aesthetic function, and of material and psychological limitations.

"The limitations referred to have been quite generally accepted as desirable for the creation of coherent design. In addition to the natural ones provided for by the medium, these important limitations are furnished by the use of scientific method. The appropriately useful portions of this method which are applicable are established epistemologically. The Structuralist designer does not make the common mistake of confusing 'universes of discourse' or 'levels of abstraction.' The problems of the laboratory ... can only be of secondary interest to the artist. His problem is one of communication and is thus on the level of psychology. ...

"The systematic application of mathematical methods to design was made for form long prior to any systematization of color. Yet the difficulties of *limiting the field*, one of the first steps in the application of scientific method to any problem, are far more difficult for form than they are for color<sup>1</sup>.

"Structuralism may be classified as scientific in the broad sense of the word. *It is based upon organized knowledge*. The forms used are appropriate to measurement. The colors are appropriate to measurement. ... The basic mathematical principles of relationships are those commonly employed in ancient and modern mathematical or geometrical techniques. The study of achromatic or monochromatic values forms a bridge-

<sup>1</sup>Dr. Henry Margenau's remarks about the applicability of scientific method to art, and especially to color, are very pertinent. They appeared in *MAIN CURRENTS* for Jan., 1957, pp. 52-53.



ing discipline and method which links the study of form with that of color.

"It must be distinctly understood that these formulae are not employed as they would be in an exact science. . . . As is the case with many other scientific activities which are not yet exact sciences, Structuralist principles are flexibly employed. . . .

"The principles of psychoanalysis, individual psychology, depth psychology, eclectic psychology, etc., are applied intuitively in practice, depending upon circumstances and context. The basic principles used by the different schools are widely admitted to be scientific. The same may be said of the social sciences. Because no close relationships are possible to establish at present between mathematically structuralized color-form configurations and relations to them as stimuli, Structuralism occupies a position similar to the above disciplines in the hierarchy of science."

—E. B. Sellon

## Science and the Liberal Arts on Trial

IF science and the liberal arts are to survive in this ever-widening technological age, then these two great areas in our culture must begin immediately to replace their self-interests with a strong mutual interdependence. "In a very literal sense, both science and the liberal arts are on trial for their lives." Dr. Glenn W. Giddings makes this opening statement in an article on "The Future of Science and the Liberal Arts" which appeared in the *General Electric Review* for July 1958. Dr. Giddings, who is Manager of Research Personnel at the GE Research Laboratory at Schenectady, was for 12 years a Professor of Physics at DePauw University.

Dr. Giddings is deeply concerned about some of the long-range implications of education in our society, such as the reciprocal relationship between science and society. He writes: "We all accept as a truism the cliché, 'We live in a scientific age,' for certainly our society depends upon science. We give very little thought, however, to the converse idea that our science depends upon society. . . .

"The combination of rationalism and empiricism characteristic of the Puritan ethic forms the basis of modern science. The basic assumption of modern science is that nature is orderly. The scientist assumes that nature is an intelligible order and that by properly asking questions of nature he may elicit intelligent answers."

In our generation we have witnessed a striking culmination of the reciprocal effect between sciences and society in a favorable social climate. Most of our comforts and conveniences have stemmed from the work of a relatively few scientists, who could not possibly have foretold the applications of their work. Only recently have the streams of science and invention merged to form the basis of our own technological

society. As the technology advances, it must be supported by a continuing stream of new scientific knowledge—for which there must be a continuing supply of competent scientists.

In speaking about the humanities—those studies that are designed not to produce a better living but a better life—Dr. Giddings recalls that the broader term "the liberal arts," is usually interpreted today to include the basic sciences. And we take a liberal education so much for granted that sometimes its proponents cannot clearly define either its means or its ends. Dr. Giddings quotes from an article, "Adventure in Education," which appeared in the college of Wooster Bulletin: "Liberal studies should do more than furnish a quality in men and women. They should generate action. They should emerge into the activity of a responsible citizen. Free to choose because he knows what the choices are, the liberally educated person can assist in those discriminations and value judgments that are the very life of a state."

Dr. Giddings notes that scientists, both individually and collectively, have not taken the trouble to interpret to the lay public the spirit of science or its results. The image of the scientist in the popular mind is very important, but most scientists do not seem deeply concerned that the present image is a caricature.

The author feels that in their failure to make an understanding of science a fruitful part of our common culture, our liberal arts colleagues are not only failing in an evident responsibility, but missing an unique opportunity. Anti-intellectualism, the veiled distrust or hostility to the "egghead," is a recognizable symptom of the distrust of the unknown.

A truly effective liberal arts curriculum would prepare men and women to perceive and comprehend the great issues of our times, and the forces behind them. This includes understanding of the new insights into the nature of ourselves and of our universe that trickle back from the frontiers where science is winning new territory from the true unknown. Only by making the spirit as well as the field of science part of the comprehension of an educated person, hence a valid part of our culture, can a "liberal education" continue to be relevant to time and circumstance, and thus maintain its vitality as a component in our culture.

"Making science a part of our culture is a worthy objective for a college of liberal arts. Whether we like it or not, we do live in a technological civilization founded upon science, a civilization that will rise or fall as science and liberal education prosper or as they fail. To be truly literate, one must have an appreciation for the values and modes of thought of the sciences as well as the humanities.

"Too often in the past the humanities have exhibited prideful illiteracy in science, and technical men have been notoriously illiterate in the humanities and the arts. It need not be so—in fact it must not continue to be so if we are not to succumb to the rising hysteria and anti-intellectualism of our times."

—Alan Mannion.

## The Social Roots of Education's Dilemma

THE Oregon Education Policies Commission has recently released a statement entitled *The Public Schools and Our Times*, which "is intended to raise questions and stimulate some thought regarding the relation of the public schools to the society which they serve . . ."

In an introduction, the nature of the present school crisis is identified. Because the American school system is an integral part of our national character, each local system reflects the desires and compulsions of the community which it serves, and by which it is controlled. Our school systems, unlike their European counterparts, are very diverse—even "untidily pluralistic"—but paradoxically they have contributed to national unity. Since they are decidedly "of the people," it is superficial to believe that the present school crisis can be anything other than a total cultural one.

In order to understand the crisis, certain trends in our national life must be seen. One is: Though cast in the role, we as a nation have not actually prepared ourselves for world leadership, and we are having difficulty in determining the dimensions of our position as leader among the free nations. We have not accomplished the delicate balance between materialistic and non-materialistic values. Our pre-occupation with an enemy ideology has inhibited our natural interest in the efforts of those struggling for self-government. All these contradictions have reflections in the public schools.

One dilemma arises through the fact that, though we think of ourselves as great technologists, we have had little agility in making decisions in today's fast-moving world of affairs. Lack of courage and ability to make clear-cut decisions is a general trend, exemplified by the school integration problem. Extreme emphasis is laid upon the accumulation of *things*, accompanied by an insatiable public appetite for sensation and entertainment. These conditions are encouraged by every device of mass media. Adults make little protest against exploitation by advertisers of the innocence of children, of their unformed judgments, and limited experience. Children are exploited as entertainers, and given adult sanction to neglect school and the natural business of a child. They are over-indulged in every way, and instead of being assigned duties and real responsibilities, they are over-protected.

The role of science is confused with technology, and there is a serious trend toward diminishing certain disciplines and skills. Many congressmen advocate a federal scholarship bill limited to science and mathematics students, yet every true scientist knows that we must preserve those disciplines which transcend fact in the search for truth. This trend to sterilize science confronts our teachers with enormous problems.

Again, we have astounding devices for communication, but we are poorly informed in many areas. A curtain of secrecy has been draped over many governmental activities. Television has brought Congressional hearings and public personages to millions of people, yet a relatively few individuals, with understandably limited interests, are in a position to determine how television is used. The public has almost no control nor influence over programming.

Another social paradox is that, while many have more leisure than ever, we have failed to develop the creative use of our freedom. We have won control over nature, but we neglect man's relationship to nature. Thus the teaching of social responsibility is infinitely more complex than it was a few years ago.

On the hopeful side, many positive factors should be noted. Not only are our living standards profoundly improved, but our expectations for man have increased. It is this philosophy of advancement which helps keep our critical attitude in perspective. A careful scrutiny of education, as a key institution projecting our faith in a free society, should be based upon the ideas which have shaped it. Among the most important of these is equality of educational opportunity, made possible by a single free system of public education. This great idea is frequently misunderstood. It does not mean uniformity, and those who think it does advocate a philosophy which is the complete antithesis of the traditional role of public schools in a free society.

The fact that Americans pride themselves on being practical has created demand for vocational and technical courses. When at last we discover that it is "practical" to develop creativity, and to have a foreign service composed of persons who can speak the language of the country in which they serve, our school curricula will reflect this.

It should be noted that the fundamental American tradition of the separation of church and state has not prevented the public schools from contributing to our moral fiber. They have helped to integrate millions of immigrants into the main stream of America. Public schools teach and demonstrate the brotherhood of man, for most children in America play and learn with their peers of all faiths and ethnic groups.

Americans have an extravagant reliance on education. They have demanded so much of their schools that sometimes the essential business of teaching seems lost. Therefore, when criticizing our schools it is essential that we keep the "whole of things" in view.

The need is for stronger support. The big question today is whether we have the collective integrity as a society to support our great moral commitments with appropriate action. Some would have our schools devoted to curricula designed for a narrow "survival" policy. Yet long-term survival can only rest on those values which make survival worthwhile. The next

great strides forward will be vastly more dependent upon social inventions than on technical ones.

A more vigorous leadership requires that each educable child develop his potential to the fullest. We have not reached this or other goals. As we move forward, criticism will increase, but greater support can be expected from those who have the integrity to make it their business to know what is best for children and the nation. Our present crisis is not just a school crisis; it belongs to everyone. And everyone is thereby responsible.

—E. B. Sellon

## The Process of Being Human

THE psychologist Carl Rogers has long maintained that a human being is a "process" rather than a static state (which would be lack of growth). Thus he does not like the concepts of psychological health which are based on "adjustment" because they imply that there is an external state of affairs or norm for society to which the person adjusts. If society is wrong in some of its concepts, the individual would have to adjust or conform to the erroneous ideas.

Thus in his experience with non-directive therapy he has attempted to learn something of the "process of psychotherapy or the process by which personality change takes place." Individuals in treatment go through certain stages of psychological growth, and Rogers discusses these stages in "A Process Conception of Psychotherapy," in the April, 1958, issue of *The American Psychologist*. He discovered that "individuals can move from a fixity or homeostasis through change to a new fixity. But more significant is the continuum from fixity to changingness, from rigid structure to flow, from stasis to process." After he developed his concept of a "continuum of process," he was able to discriminate seven stages in this process of change.

Stage number one is characterized by extreme "fixity" and remoteness, so that the individual is not likely to come voluntarily for therapy. There is "an unwillingness to communicate self. Communication is only about externals." Feelings and personal problems are not recognized or perceived at this stage, and there is no desire for change. Close and communicative relationships with others are construed as dangerous and undesirable.

These statements emphasize the psychological fixity of this end of the continuum. "The individual has little or no recognition of the ebb and flow of the feeling that lies within him." He construes his experience rigidly in terms of the past. He is so structure-bound that everything is related to past experience, and nothing is experienced in the present as new.

Stages two, three and four take place as a person experiences himself as completely accepted by the therapist. There occurs a loosening of symbolic ex-

pression in regard to feelings, concepts, and the self. A "freedom of organismic flow" begins to occur.

Thus in the fifth stage feelings are expressed freely as in the present. They "bubble up, seep through," in spite of the fear and distrust which the client feels at experiencing them with full immediacy. There is an increasing ownership of self feelings and a desire to be these or to be the "real me." There is a clearer facing of contradiction and incongruities in experience, and an increasing self-responsibility for the problems being faced. There are freer dialogues within the self, and reduced blockage of internal communications.

Dr. Rogers refers to this stage as "several hundred psychological miles from the first stage." Many aspects of the client are in flow as against the rigidity of the first stage, and he is much closer to his organismic being, which is always in process.

As the process of growth continues in therapy, the sixth stage is regarded as rather crucial. Some of its characteristics are: the feeling which has previously been inhibited in its "process quality" is experienced with immediacy now. Feeling flows to its full results. This immediacy of experiencing and the feeling which constitutes its content are accepted by the client. The individual is able to "be" in the moment, with little self-conscious awareness. Thus the self as an object tends to disappear and the self is, subjectively in the existential moment. In this stage, internal communication is free and relatively unblocked. It is as though once an experience is fully in awareness, fully accepted, then it can be coped with effectively, like any other clear reality.

The seventh stage seems almost inevitable once the sixth has been reached. It occurs as much outside the therapeutic relationship as in it, and does not seem to be so dependent upon therapy as the other stages. This stage is characterized by new feelings which are experienced with immediacy and richness of detail. There is a growing sense of ownership of the changing feelings, and a basic trust in one's own total organismic process. Experience is interpreted in its newness, not as part of the past. Internal communication is clear, with feelings and symbols well matched and fresh terms for new feelings. Because all elements of experience are available to awareness, choice becomes real and effective.

Dr. Rogers emphasizes that a person is never wholly in one or another stage of the process, but there is a consistency in the manner of experiencing. Thus a client who is generally at stage two or three seems unlikely to exhibit any behavior characteristic of stage five. The person who gets as far as the last stage will continue to be a continually changing person, experiencing with immediacy each new situation, responding to it with real and accepted feeling, and construing its meaning in terms of what it is, not what it should be according to some past experience. What is most significant, he has become an integrated process of changingness.

—William M. Nicholson



## NEWS AND NOTES

**M**ECHEANIZATION has brought present and promised benefit along with physical and moral disturbance. The task of ensuring that the products of technology shall have only wholesome effects presents enormous problems, not only by reason of direct impact of machines on society, but through the shift in economic power.

Nuclear energy is most conspicuous in all minds. Its deleterious physical, moral and political effects are evident, yet its positive benefits for mankind are implicit in all these. Shall we seek solutions one by one for the problems raised, as if each had a single and separate cause? Is it even possible to correct evils solely through political and economic change? Is there not a deeper level of concern, because the problems are not in the machines but in the people?

Recently the present writer happened upon a familiar scene. He entered a playroom given over to televisioning at the precise moment when the observers, two charming young sisters, were being edified by the sight of a faultlessly-attired woman drawing a gun on a man. This is a current art form which needs a name—successor to that earlier invention, the drawing-room-bedroom comedy of bad manners. As to the latter, parents could go, leaving the children at home. But in our present advanced state of technology, everything comes to us at home. In this case, what are parents to do—act as police and censors? What a change from that simpler age when there was a “pause in the day’s occupation which was known as the children’s hour”!

We are confronted with so many problems: the rich promise alongside much of the actual content of television—the incessant threat alongside the impracticality of war—how to get to the moon and never mind about heaven. And twenty-two additional puzzles. Are children made for the advertiser, or is the advertiser to be curbed (if not abolished) for the sake of the children? We may incline to the latter, but then the real question is brought into notice: What are people? What is life for? These issues have only one root. Man has devised mathematics, and discovered the laws of mechanics and the properties of electrons and the like, on his way to the moon. But no one thinks of the moon as his real destination.

A study of bits and pieces of knowledge will not yield understanding of the human potential and of nature as man’s known environment. Yet only a very few scholars agree on the need and the means for a start on the basic problem.

What will the U.S.A. be like a hundred or three or five hundred years hence? This is the time it may take (at the present rate of adding new problems as fast as we solve others) in which our real wealth of nuclear energy can be applied at all levels. This offers an opportunity for human freedom greater than all

of man’s other physical resources. Man is entitled to this wealth, but what will he do with it? That is the question we avoid, but which does not vanish from inattention. How can it? One day man will have to confront what he is, and what he is meant to be by nature.

**I**T became obvious about nine years ago that all those who were working upon the task of improving the teaching of mathematics should come together to give purpose and impetus to that task. This included all those who were contributing to the study of how mathematical concepts are formed (psychologists, epistemologists), those attempting to rewrite mathematics so that rigor might replace chaos (logicians, mathematicians), and those devoted to discovering what makes some people reluctant to undertake a study which appears so natural and fascinating to others (selected teachers). The International Commission for the Study and Improvement of the Teaching of Mathematics became the largest and most powerful body of people who could influence mathematics teaching everywhere, and its influence is now being felt beneficially in most quarters. Its action is dual: by intensive discussion in seminars it helps in the selection of topics that need study, and through its national leaders an accelerated chain reaction is set off in many places at the same time.

A number of decisive trends in the improvement of mathematics teaching in various countries can be traced to the Commission’s initiative.

**I**N MAIN CURRENTS for March 1958, Professor D. H. Andrews of Johns-Hopkins discussed the developments in physics and chemistry which have come from studies of the chemical bond, the internal geometry of crystals, and related topics, in an article titled “Integral Order in Nature.”

On the University’s television program of October 19th he treated this question of the hidden resonant harmonic, stereometric orders in connection with thermodynamics, especially of  $H_2O$ , under the title “Waltzing Water.” The visual part of the program included scientific demonstrations, and young couples dancing in ways that illustrated what was being said. The content and treatment of the program were fascinating, not only as contemporary science simply and delightfully put, but as philosophy.

At one stage Dr. Andrews, who is himself a musician, pointed out that it is possible to transpose harmonies in any wave system to the audible range in air. He moved quietly to a piano, played a chord of two, and then a strange phrase made audible the atomic interrelations in specific molecules. Hence the title of a memorable program.

—F. L. Kun



## REVIEWS

### Loosening the Evolutionary Restrictions upon Man

OUR minds are challenged to the utmost in our attempts to penetrate the inscrutability of the world at the physio-chemical level. But as we ascend to the realm of living organisms we are confronted with an inconceivably more complex order of phenomena. Scientists concerned with investigating life's manifestations have for the most part avoided the difficulties peculiar to biology by narrowing the field until it can be harmonized with the principles of the physical sciences. Man's outlook in many directions has been influenced by this retreat into the inanimate. The orthodox approach to organic evolution, for example, has not been encouraging to the human spirit. The concept that man along with his fellow beings of this planet has resulted from random heritable variations in interaction with the environment has had serious implications not only for science but also for philosophy and religion.

It is refreshing therefore to encounter a book written by a distinguished biologist which emphasizes these thoughts and discredits the tenability of the evolutionary theory which has had such a disturbing effect on mankind.

*The Strategy of the Genes*, by C. H. Waddington, with an appendix by H. Kacser (Macmillan Co., 262 pp., 1958, \$4.00) gives the author's views on two problems of fundamental importance for theoretical biology. These are "firstly, the nature of biological organization and the developmental processes which bring them into being, and secondly, the theory of evolution." The book ends with a chapter by Dr. Kacser on some physico-chemical aspects of biological organization.

The book is written mainly for those who have the background of training in biology to follow the ideas and hypotheses advanced. There is much discussion which involves the terminology and laboratory data peculiar to the science of genetics.

The author is mainly concerned with certain difficulties in our present ideas on evolution. He considers that natural selection and randomness of gene mutation, though basic to current evolutionary theory, are scientifically inadequate. He emphasizes that, contrary to the elements of the physical world, biological entities are involved in time. There is the time element in evolution, the individual life cycle, and in the turnover of energy and materials in daily living. This means that a living organism as viewed in the present is an abstraction of its total value. Further, the organism and its environment cannot be considered independently of each other. It is pointed out that "in current biology most of our theories leave one or other of the time scales out of account."

In other directions too there is this tendency for oversimplification of living organisms. The author states that "the gravest defect of modern science as a general philosophy is its exaggerated atomism." Scientists, by a fragmentary approach to biology, have adopted theoretical concepts which restrict life—"it was above all the doctrine of Natural Selection which placed Man him-

self inexorably in a sheer mechanistic universe . . ."

Professor Waddington proposes an approach to organic evolution which includes all the known dimensions of biological organisms and which also includes the principle of natural selection. There is no disposition on the part of the author to regard his ideas as anything more than a beginning—"the integration between the living organism and the rest of the world is admittedly by no means complete." But as a result of his hypothesis—" . . . elements of discontinuity are set within a framework of essential connectedness."

The value of the work perhaps lies not so much in Professor Waddington's theoretical concepts as in his searching analysis of the limitations and defects of the prevailing ideas in the field of organic evolution.

—Alfred Taylor

### Up and Down the Ladder of Life

IN reviewing books on science in these pages, the policy is to select for notice those which provide materials for the philosophy of nature in lay language. Technical works of indisputable importance are now and then noticed as well. *The Origins of Life*, by Albert Ducrocq, was published as *Logique de la Vie* in Paris (by Juliard) in 1956, and now appears in English (Elek Books, London, 213 pages, illustrated, 25/-) to enrich the former non-technical category.

It brings the reader up to date on the biochemists' successes in moving down from cells, and nuclei, through proteins and viruses, to amino acids, and thus to ammonia, water, and methane and on to carbon, hydrogen, oxygen and nitrogen. The first half of the volume constitutes a handbook for those who have not followed all this. The author then turns around and moves upward through aggregation, conjugation, and into evolution: genes, sexual reproduction, mutations and so on.

The assumption all through is that at every stage we have a servo-mechanism capable of sustaining and slowly increasing order in the midst of natural entropy. In short, we are offered the modern form of mechanism.

In fact the author and Dr. W. Mays, Senior Lecturer in Philosophy at the University of Manchester, who writes an Introduction, (taken together) boldly maintain that life arose by mechanical principles, and that it is possible to build a servo-mechanism that would use raw materials and reproduce itself. Some questions remain. For example, could such a machine also produce the analogue of a germ cell from which would grow up the parent machine? What about self-repair, *while in use*? The idea of Cadillacs and Oldsmobiles giving birth to Chevrolets is no doubt attractive, but hardly a serious program.

Where does this argument get off the rails? About page 82, where a paragraph opens: "Yes, the molecule as such is a machine." We read about the internal motions and their quantized values ("fixed numerical constants"). "This structure gives the molecule its own electric field and its magnetic moment," organization,

and resonance for "influencing its immediate environment," i.e., exercising selectivity. The field! What is this? The argument continues on its course, mechanically, as if the causal status of the field had not yet been established.

Nevertheless this is a priceless volume for anyone who cares to follow the course of empirical and sound theoretical inquiries into life. The speculation may be along old fashioned lines, but the data is invaluable. A must unless the reader has been collecting his own data for years.

—F. L. Kunz

## The Need to Know the Self

CARL Jung discusses the plight of the individual in modern society in his new book, *The Undiscovered Self* (Little, Brown, 1958, \$3.00, 113 pp.). He sees real danger that the masses may succumb to weakness and surrender their freedom, corrupted under a totalitarian tyranny because of the very limited degree of self knowledge in the so-called normal person.

By self knowledge Jung means a great deal more than is usually taken for granted. "People measure their self knowledge by what the average person in their social environment knows of himself, but not by the real psychic facts which are for the most part quite hidden from them." Dr. Jung thinks that self knowledge is a matter of getting to know the individual facts and that theories help very little.

When any natural human function becomes lost, i.e. is denied conscious intentional expression, a general disturbance results. When religious feelings are denied and the goddess of reason becomes so triumphant that the individual feels compelled to split off from himself those things which he regards as irrational, the psychological effect is to project these repressed parts of the psyche onto another. The dictator state provides a good means for projecting this "shadow side," for it allows the individual to disown all responsibility. Jung points out that there is danger in either capitalism or communism to people who are unwilling to understand their own shadow side and their unconscious psyche. The need is for self knowledge at a deep level. "Resistance to the organized mass can be effected only by the man who is as well organized in his individuality as the mass itself."

"Today a philosophy is no longer a way of life as it was in antiquity; it is turned into an exclusively intellectual and academic affair. Unfortunately our denominational religions which caused no difficulty in the Middle Ages have become strange and unintelligible to the man of the modern world. Despite this conflict with modern science, a deep instinct bids him hang onto ideas which, if taken literally, leave out of account all the mental developments of the last five hundred years." Yet the creeds proclaim a doctrine whose symbols, however disputed their interpretation, nevertheless possess a life of their own because of their archetypal character. They require feeling and intuition to supplement intellectual understanding.

Jung believes that the individual should turn more towards a spontaneous religious experience "which brings the individual faith into immediate relation with God."

This experience can only be found through rigorous self examination, which leads to the discovery that the unconscious mind is the only accessible source of religious experience. "As to what the further cause of such an experience may be, the answer to this lies beyond the range of human knowledge."

It is obvious that reason alone will not suffice man, for his moral nature has lagged behind the development of his unconsciousness. "Nothing has had a more divisive and alienating effect upon society than moral complacency and lack of responsibility, and nothing promotes understanding and rapprochement more than a mutual withdrawal of projections. This necessary corrective requires self-criticism, for one cannot just tell the other person to withdraw them. . . . We can recognize our prejudices and illusions only when, from a broader psychological knowledge of ourselves and others, we are prepared to doubt the absolute rightness of our assumptions and compare them carefully and conscientiously with objective facts."

Jung does not think that we can produce a change by persuading or preaching. He writes, rather, "of the well known fact that anyone who has insight into his actions, and has thus found access to the unconscious, involuntarily exercises an influence on his environment. . . . It is an unintentional influence on the unconscious of others, a sort of unconscious prestige, and its effects last only so long as it is not disturbed by conscious intention."

Dr. Jung does not discuss at length the nature of the undiscovered self, but rather offers the plight of the world as a necessary incentive for its search. A hint at what he believes to be the nature of the self, however, has been given in his *Two Essays on Analytical Psychology*. He mentions therein a person undergoing a successful analysis who at first seemed to be centered in the conscious ego but later found a center between the conscious and unconscious mind. "I have called this center the self. Intellectually the self is no more than a psychological concept, a construct that serves to express an unknowable essence which we cannot grasp as such, since by definition it transcends our powers of comprehension. It might equally well be called the 'God within us.' The beginnings of our whole psychic life seem to be inextricably rooted in this point, and all our highest and ultimate purposes seem to be striving towards this. This paradox is unavoidable, as always, when we try to define something that lies beyond the bourn of our understanding."

—William M. Nicholson

THE American public owes a debt of gratitude to the publishers who, through the medium of paper-backs, are inducing an ever-increasing number of people to form the habit of book buying. Vintage, Evergreen, Anchor, Mentor and Signet, among others, are printing editions of a size which may well compete with the Russians, and of a quality and variety which they, of course, do not wish to emulate. Among the outstanding titles, we list a brief selection of those which have recently come to our desk: *Religion Without Revelation*, by Julian Huxley, *The Anvil of Civilization*, by Leonard Cottrell, *Human Types*, by Raymond Firth, *Evolution in Action*, by Julian Huxley, and *The True Believer*, by Eric Hoffer. These are all Mentor Books, at 50¢.